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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/542,956

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Yukio Sakashita

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OLIFF & BERRIDGE, PLC

P.O. BOX 320850

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EXAMINER

BLUM, DAVID S

ART UNIT

PAPER NUMBER

2813

MAIL DATE

DELIVERY MODE

11/20/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/542,956	Applicant(s) SAKASHITA, YUKIO	
	Examiner DAVID S. BLUM	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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This action is in response to the amendment filed 7/20/09.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5 and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kijima (US 6,162,293) in view of Nibou (Chemical Fabrication $\text{SrBi}_4\text{Ti}_4\text{O}_{15}$),

Kijima teaches the device of claims 1-14 as follows.

Regarding claim 1, Kijima teaches a dielectric thin film including a bismuth layer compound having a c-axis oriented vertically with respect to the substrate (column 5 lined 30-31), the bismuth layer compound composed of a thin film capacitance element (abstract), composed of the formula $(\text{Bi}_2)_2\text{Sup}^{2+}(\text{A}_{m-1}\text{B}_m\text{O}_{3m+1})\text{Sup}^{2-}$ or $(\text{Bi}_2)_2\text{A}_{m-1}\text{B}_m\text{O}_{3m+3}$ (column 4 lines 45-52), where m is an even number (integer or larger, includes 2, column 3 lines 39-40), where A is selected from the group of Na, K, Pb, Ca, Sr, Ba, Bi, and B is selected from Fe, Ti, Nb, Ta, W, and Mo (column 3 lines 35-40).

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As A may include Bi, an excess of Bi may be included. However, Kijima does not teach the range of 0.4 to 0.5xm mol.

Nibou teaches a bismuth layer of the formula in claim 1, with m= to an even number (1 Introduction) and an excess of bismuth in 0-0.5 mol (3.2).

These ranges are considered to involve routine optimization while it has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* (105 USPQ233), the selection of reaction parameters such as temperature and concentration would have been obvious:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art. Such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

One skilled in the requisite art at the time of the invention would have used any ranges or exact figures suitable to the method in the process of forming a bismuth compound capacitance layer regarding concentrations using prior knowledge, experimentation, and observation with the apparatus used in order to optimize the process and produce the

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bismuth compound capacitance layer structure desired to the parameters desired as taught by Nibou.

Regarding claim 2, Nibou teaches the excessive content of Bi in the range of 0.4-0.5 mol (3.2).

Regarding claim 7, Kijima teaches a c-axis orientation of bismuth with respect to the substrate to be 80% or more (column 5 lines 32-33).

Regarding claim 8, the limitation of leakage current density at a given electric field density reflects usage and not the device structure itself. Therefore, it is given no patentable weight. Further, as the materials are the same, the same physical properties would result.

Regarding claim 9, the limitation of average rate of change of a capacitance against a temperature range reflects usage and not the device structure itself. Therefore, it is given no patentable weight. Further, as the materials are the same, the same physical properties would result.

Regarding claim 10, Kijima forms a capacitor, thus the lower capacitor, dielectric thin film, and upper electrode are formed successively.

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Regarding claim 11, Kijima teaches the total thickness of the capacitance element to be 200nm or less (column 6 line 10).

Regarding claim 3, Kijima teaches a dielectric thin film including a bismuth layer compound having a c-axis oriented vertically with respect to the substrate (column 5 lined 30-31), the bismuth layer compound composed of a thin film capacitance element (abstract), composed of the formula $(\text{Bi}_2)_2\text{Sup}_2+(\text{A}_{m-1}\text{B}_m\text{O}_{3m+1})\text{Sup}_2$ - or $(\text{Bi}_2)_2\text{A}_{m-1}\text{B}_m\text{O}_{3m+3}$ (column 4 lines 45-52), where m is an even number (integer or larger, includes 2, column 3 lines 39-40), where A is selected from the group of Na, K, Pb, Ca, Sr, Ba, Bi, and B is selected from Fe, Ti, Nb, Ta, W, and Mo (column 3 lines 35-40). As A may include Bi, an excess of Bi may be included. However, Kijima does not teach the range of 0.4 to 0.5xm mol.

Nibou teaches a bismuth layer of the formula in claim 1, with m= to an even number (1 Introduction) and an excess of bismuth in 0-0.5 mol (3.2).

These ranges are considered to involve routine optimization while it has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* (105 USPQ233), the selection of reaction parameters such as temperature and concentration would have been obvious:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not

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merely degree from the results of the prior art. Such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

One skilled in the requisite art at the time of the invention would have used any ranges or exact figures suitable to the method in the process of forming a bismuth compound capacitance layer regarding concentrations using prior knowledge, experimentation, and observation with the apparatus used in order to optimize the process and produce the bismuth compound capacitance layer structure desired to the parameters desired as taught by Nibou.

Regarding the specific formula of $\text{SrBi}_4\text{Ti}_4\text{O}_{15}$, Kijima is silent as to the specific formula, although it would be within the parameters described. Nibou teaches this for a bismuth layer.

Regarding claim 4, Kijima teaches a dielectric thin film including a bismuth layer compound having a c-axis oriented vertically with respect to the substrate (column 5 lined 30-31), the bismuth layer compound composed of a thin film capacitance element (abstract), composed of the formula $(\text{Bi}_2)_2\text{Sup}^{2+}(\text{A}_{m-1}\text{B}_m\text{O}_{3m+1})\text{Sup}^{2-}$ or $(\text{Bi}_2)_2\text{A}_{m-1}\text{B}_m\text{O}_{3m+3}$ (column 4 lines 45-52), where m is an even number (integer or larger,

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includes 2, column 3 lines 39-40), where A is selected from the group of Na, K, Pb, Ca, Sr, Ba, Bi, and B is selected from Fe, Ti, Nb, Ta, W, and Mo (column 3 lines 35-40).

As A may include Bi, an excess of Bi may be included. However, Kijima does not teach the range of 0.4 to 0.5xm mol.

Nibou teaches a bismuth layer of the formula in claim 1, with m= to an even number (1 Introduction) and an excess of bismuth in 0-0.5 mol (3.2).

These ranges are considered to involve routine optimization while it has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* (105 USPQ233), the selection of reaction parameters such as temperature and concentration would have been obvious:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art. Such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

One skilled in the requisite art at the time of the invention would have used any ranges or exact figures suitable to the method in the process of forming a bismuth compound capacitance layer regarding concentrations using prior knowledge, experimentation, and

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observation with the apparatus used in order to optimize the process and produce the bismuth compound capacitance layer structure desired to the parameters desired as taught by Nibou.

Regarding the specific formula of $\text{SrBi}_4\text{Ti}_4\text{O}_{15}$, Kijima is silent as to the specific formula, although it would be within the parameters described. Nibou teaches this for a bismuth layer.

Regarding claim 5, Kijima teaches a dielectric thin film including a bismuth layer compound having a c-axis oriented vertically with respect to the substrate (column 5 lined 30-31), the bismuth layer compound composed of a thin film capacitance element (abstract), composed of the formula $(\text{Bi}_2)_2\text{Sup}^{2+}(\text{A}_{m-1}\text{B}_m\text{O}_{3m+1})\text{Sup}^{2-}$ or $(\text{Bi}_2)_2\text{A}_{m-1}\text{B}_m\text{O}_{3m+3}$ (column 4 lines 45-52), where m is an even number (integer or larger, includes 2, column 3 lines 39-40), where A is selected from the group of Na, K, Pb, Ca, Sr, Ba, Bi, and B is selected from Fe, Ti, Nb, Ta, W, and Mo (column 3 lines 35-40). As A may include Bi, an excess of Bi may be included. However, Kijima does not teach the range of 0.4 to 0.5xm mol.

Nibou teaches a bismuth layer of the formula in claim 1, with m= to an even number (1 Introduction) and an excess of bismuth in 0-0.5 mol (3.2).

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These ranges are considered to involve routine optimization while it has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* (105 USPQ233), the selection of reaction parameters such as temperature and concentration would have been obvious:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art. Such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

One skilled in the requisite art at the time of the invention would have used any ranges or exact figures suitable to the method in the process of forming a bismuth compound capacitance layer regarding concentrations using prior knowledge, experimentation, and observation with the apparatus used in order to optimize the process and produce the bismuth compound capacitance layer structure desired to the parameters desired as taught by Nibou.

Regarding the specific formula of $\text{SrBi}_4\text{Ti}_4\text{O}_{15}$, Kijima is silent as to the specific formula, although it would be within the parameters described. Nibou teaches this for a bismuth layer.

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Claims 6 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kijima (US 6,162,293) in view of Nibou (Chemical Fabrication $\text{SrBi}_4\text{Ti}_4\text{O}_{15}$) and in further view of Desau (EP000877100A1) or Hintermaier (US 6,303,391).

Regarding claim 6, Kijima teaches the device of claim 6 as above in regard to claim 1, except for further including one rare earth element from Sc, Y, La, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu. Hintermaier teaches the device that includes Sc, Y, La, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu. Further, Desau teaches improved fatigue retention with the addition of La (pervoskite metal oxides page 2 lines 25-30).

It would be obvious to one skilled in the requisite art at the time of the invention to modify Kijima by including a rare earth as taught by Hintermaier to be known and by Desau to improve fatigue.

Regarding claim 12, Desu teaches a plurality of dielectric films of claims 1-9, are alternately stacked among the electrodes.

Regarding claim 13, the thin film multilayer film of Kijima is 200nm or less (column 6 line 10).

Response to Arguments

3. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (571)-272-1687) and e-mail address is David.blum@USPTO.gov .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Landau, can be reached at (571)-272-1731. Our facsimile number all patent correspondence to be entered into an application is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/David S Blum/

Primary Examiner, Art Unit 2813

November 20, 2009